

Zero Retries issue 0024 2021-12-17

Advanced Amateur Radio - Data Communications; Space; Microwave... the fun stuff! The Universal Purpose of Ham Radio is to have fun messing around with radios. - Bob Witte K0NR; Amateur Radio is literally having a license to experiment with radio technology. - Steve Stroh N8GNJ; Ultimately, amateur radio must prove that it is useful for society. - Dr. Karl Meinzer DJ4ZC; We are confronted by insurmountable opportunities! - Pogo; Nothing great has ever been accomplished without irrational exuberance - Tom Evslin; Irrational exuberance is pretty much the business model of Zero Retries Newsletter - Steve Stroh N8GNJ.

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor

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Web version of this issue - <https://www.zeroretries.org/p/zero-retries-0024>

Request to Send

200+ Subscribers!

Woo Hoo! Zero Retries now has 200+ subscribers! Thanks folks! I'm honored!

Countdown to [Hamvention](#) 2022 - May 20-22, in Xenia, Ohio - 22 weeks...

Well, [that](#) was fun! In trying to return to "normal", as I said in Zero Retries 0023:

I'm actually kind of losing ground on the things I want to discuss in Zero Retries as the "interesting for Zero Retries" queue keeps getting deeper.

Thus, this issue, I'll keep the pontificating short.

Personal Note re: Bellingham Makerspace

As of 2021-12-15, my wife Tina KD7WSF and I are no longer associated with the Bellingham Makerspace and the Bellingham Makerspace Amateur Radio Group. Thus ends my experiment to try to create a different kind of Amateur Radio organization at a Makerspace. It might be possible to pivot my ideas for a "new paradigm Amateur Radio Group" to a different community in the Bellingham area - to be determined.

Icom SHF Project - Super High Frequency Band Challenge

([Page Link](#)) ([PDF - Icom SHF Project - Super High Frequency Band Challenge - Vol. 1](#))

Icom Incorporated (Headquarters: Hirano-ku, Osaka, President: Hiroshi Nakaoka) has been doing technical research on a new project to create a product from scratch by utilizing our wireless communication technology knowhow cultivated over more than half a century. Under the theme of "ICOM SHF Project—Super High Frequency Band Challenge —", we started to develop a new amateur radio available for use in the 2.4 GHz and 5.6 GHz bands.

Icom engineers are working hard to research and develop a number of never cleared challenges within the SHF band, such as large cable loss and higher frequency stability requirements. The ultimate goal is to bring it to the market as a new radio product.

Icom is striving to bring to you a new era in fun and possibilities of an SHF band amateur radio, which to date has had high technical and equipment hurdles to overcome, and we hope to make these bands more attractive and active so that anyone can easily operate on them.

We are developing an epoch-making SHF band amateur radio that no one has never imagined before.

Please watch with intrigue as we continue with our new challenges, such as what kind of ideas and technologies will be implemented, and what kind of functions and designs will be used.

I'm encouraged that an Amateur Radio manufacturer like Icom is actively considering developing some "new technology" for Amateur Radio. The last time they took a leap like this in Amateur Radio networking was in 2004 when they released the D-Star ID-1 system for 1240-1300 MHz offering a data rate of "128 kbps".

It will be interesting to see what Icom comes up with. I'm surprised that they mention that a challenge is "large cable loss". The solution to "large cable loss" at 2.4 GHz and 5.x GHz is, simply, not to have any, or very little cable - as in put the radio very close to the antenna. That's what the Wireless Internet Service Providers (WISP) vendors do to maximize the minimal transmit power allowed under US Part 15.247 rules - don't throw away transmit power on long feedlines. That's a paradigm shift for Amateur Radio which isn't used to thinking of the radio as being remote from their desktop, but the "put it up on the tower" paradigm has been normal for such "data radios" for the past two decades.

An alternative approach is to make a desktop unit that transmits at, say, 50-54 MHz at low power, a long feedline run (if necessary), and the unit near the antenna is a combination transverter from 50 MHz to 2.4 GHz and a 2.4 GHz power amplifier. Feedlines aren't that lossy at such frequencies.

I *hope* Icom is soliciting ideas from a wide variety of Amateur Radio operators who are actively thinking about and building Amateur Radio networks about what *they* want to accomplish / what they *need* in such Amateur Radio network systems / what is *feasible* to implement. For example, a system that would be most welcome is an "Advanced AREDN Radio" that would use AREDN firmware (requires using commodity Wi-Fi chipsets) to tune slightly below the 2.4 GHz band, would use higher power allowed to US Amateur Radio operators, the radio is a hardened outdoor unit that can be mounted at the antenna, and powered by "Amateur Radio standard" 12 volts DC. At these frequencies, mesh networking is a near necessity.

If Icom wants input for this project, I'd be happy to help. *Really!* Just get in touch.

ÖVSV - New WRAN hardware - 7W 144/433 and 10W 52 MHz

([Page link - English translation](#)) ([PDF - Neue WRAN Hardware - 7W 144/433 und 10W 52MHz](#))

As broadband HAMNET access to the VHF and UHF bands, the ÖVSV is developing new hardware and software together with the Vienna University of Technology, which will soon be made available in the form of the RPX-100 kit for licensed amateur radio operators. It consists of the industrial version of the Raspberry Compute Module, an SDR from Lime Microsystems and the specially developed radio front end for the 6m, 2m, and 70cm tape.

The transceiver including the output stage is completely software-controlled, delivers 10W at 52MHz or 7W at 433MHz and, in addition to multi-user access to the HAMNET, should also enable amateur radio operators to develop their own projects.

73 de

Bernhard, OE3BIA

It wasn't stated, but WRAN is probably [Wireless Regional Area Network](#). The context (I *think*...) for this is that [HAMNET](#) is an Amateur Radio data network in Europe primarily on microwave frequencies. Traditional Amateur Radio data systems on VHF / UHF (packet radio such as 1200 / 9600 bps) is no longer adequate to "keep up" with HAMNET's data rates (and use of TCP/IP). Thus, better, faster VHF / UHF radios are needed for "non line of sight" (blocked by trees, etc.) access to HAMNET.

As I said on Twitter when I discovered this - *Woo Hoo!* This is a *very* welcome development from [ÖVSV](#) (Austria's national Amateur Radio organization) and Vienna University of Technology.

In my opinion, they did everything right with this approach. A Raspberry Pi compute module (with a requisite, probably custom, carrier board to break out specialized Input / Output) is exactly the right choice for an embedded computer. It's ubiquitous, capable, and incredibly well-supported for software, hardware, and documentation. The choice of [Lime Microsystems](#) is also a good one as they have offered several systems that are usable for Software Defined Transceiver experimentation in Amateur Radio such as the [LimeSDR](#), [LimeSDR Mini](#), and [LimeRFE](#) (RF Front End Module). The transmit power levels of the "WRAN hardware" are reasonable - if you need higher transmit power, power amplifiers are readily available. Hopefully someone can extend this design for the US Amateur Radio 219-220 and 222-225 MHz bands.

...

While I certainly didn't "call" either the Icom SHF Project or the ÖVSV WRAN hardware, I did discuss similar approaches to both of these projects in a three part series in Zero Retries called **New Paradigm Network Amateur Radios** in Zero Retries 0007, Zero Retries 0008, and Zero Retries 0009.

Great Scott Gadgets - Testing a HackRF Clone

([Link](#)) Michael Ossman [AE3H] 2021-12-07

Like every open source hardware company, we've seen clones of our products for sale on the Internet. These clones arguably provide a valuable service to the community, making our designs more widely available and at a price more people can afford. However, they also have negative effects such as an increase on our technical support burden without a corresponding increase in revenue to pay our staff.

When the quality of a clone is poor it may also degrade the reputation of our products.

The upside of Open Source hardware is that a great idea that the creator only wanted to take to prototype or small proof of concept production run can take on a life of its own by simply duplicating the open source design. That is the business model for a number of small electronic manufacturers in China - clone an open source design and offer no support.

As AE3H describes in this article, the downside of Open Source hardware is what Great Scott Gadgets is experiencing with clones of their HackRF One software defined transceiver - clones built in China without sufficient care in components and testing, and offering no support for their version. It's a cautionary tale.

Four Advanced Radio Projects from Crowd Supply

- [Kraken campaign succeeds!](#) Kraken is a phase-coherent software-defined [receiver] with five RTL-SDRs.
- [CaribouLite RPi HAT](#) CaribouLite is an open source dual-channel SDR Raspberry Pi HAT with a tuning range up to 6 GHz, in a form factor compatible with the Raspberry Pi Zero series. It has gotten a lot of attention, but not yet fully funded.
- [OreSat Ground Station](#) Future project that is a handheld satellite ground station for receiving OreSat (and hopefully other satellites).
- [Halo TD-XPAH](#) Future project that is an experimenter board implements the 902-928 MHz 802.11ah Wi-Fi "Halo" wireless standard. Hopefully it's extensible for Amateur Radio projects in 902-928 MHz.

[Crowd Supply](#) (and also [Tindie](#)) kind of seem like the "new TAPR" as *the* organization(s) to crowdfund and sell interesting radio-based products and projects.

WWV, WWVH Start Test Modulation Broadcasts

[WWV](#) is an amazing technology resource in the US, broadcasting time signals from Fort Collins, Colorado at a number of frequencies in the High Frequency bands below 30 MHz. [WWVH](#) is a "sister system" in Hawaii. WWV and WWVH are operated by the US Government's National Institute of Science and Technology (NIST).

([Link](#)) NIST is participating in a new project to study the ionosphere and its effects on high frequency (HF) radio propagation. As part of the [WWV/WWVH Scientific Modulation Working Group](#), radio stations WWV and WWVH will each broadcast test signals once per hour that will allow operators using a type of software defined receiver (SDR) to record the signal data at their location and upload it to a central server for analysis.

The test signals will initially consist of several seconds each of Gaussian white noise, chirps varying up and down in frequency, and tones varying in amplitude, frequency and length. This initial test will help characterize transmitting and receiver equipment and configurations and may be useful in determining time of flight measurements of the transmitted signal. The signals will be sent at 8 minutes past each hour on WWV, and 48 minutes past each hour on WWVH.

The project is coordinated by [HamSCI](#), the Ham Radio Citizen Science Investigation and includes representatives from the University of Scranton, Case Western Reserve University, Massachusetts Institute of Technology Haystack Observatory, University of Alabama, New Jersey Institute of Technology, TAPR, the [WWV Amateur Radio Club](#), interested amateur radio operators and others interested in citizen science.

Another article:

([Link](#)) Radio stations WWV and WWVH are now broadcasting a test modulation produced by HamSCI as part of a joint effort between NIST and HamSCI intended to enhance ionospheric research. The broadcasts started during the 1800UTC hour on November 15, 2021. The test signal is broadcast during minute 8 of WWV and minute 48 of WWVH hourly schedules, and will continue "for several weeks" according to the on-air announcement (minute 4 of WWV hourly schedule). The signal consists of various tones, chirps, and Gaussian noise bursts.

Here is a recording of the test broadcast from 2108UTC on 10MHz, recorded from a KiwiSDR hosted by N0EMP, located in northern Colorado. The frequency was 10MHz. [10MHz WWV 2108UTC 11/15/2021](#)

You can also get more technical information from the WWV page at HamSCI: <https://HamSCI.org/wwv>

Background on the [WWV Amateur Radio Club - WW0WWV](#):

The WWV ARC was first established in January 2019 to support the 100th Anniversary of radio station WWV in Fort Collins, Colorado. Several of the core organizers of the October 2019 event have kept the club going the past year and a half and have now reorganized as a not-for-profit organization in Colorado.

We look forward to exploring and supporting a variety of amateur radio topics, citizen science amateur radio initiatives, metrology themes and issues, historical ties between amateur radio and NIST as well as continued support for radio stations WWV, WWVB, and WWVH and the NIST Time and Frequency services.

In March 2021, WWV ARC formally adopted a new Constitution and By-laws, with a total of 8 members becoming the WWV ARC. We recently were recognized as an ARRL affiliated club and we are now accepting new members (9/25/21) and will start regular meetings in October 2021.

In the meantime, this site will continue to grow, and we will post new areas and pages as we continue our re-organization and ready for our first meeting toward the end of October 2021.

We look forward to sharing everything WWV and hope you'll join the club!

73

Dave Swartz, WØDAS
WWV ARC President

I love special interest technical Amateur Radio clubs like WWV ARC. I'll feature as many as I can find.

Intro to PACKRAT Tutorial Series

Paul Tagliamonte [K3XEC] 2021-12-02

([Link](#)) Some of you may know this (as I've written about in the past), but if you're new to my RF travels, I've spent nights and weekends over the last two years doing some self directed learning on how radios work. I've gone from a very basic understanding of wireless communications, all the way through the process of learning about and implementing a set of libraries to modulate and demodulate data using my now formidable stash of SDRs. I've been implementing all of the RF processing code from first principals and purely based on other primitives I've written myself to prove to myself that I understand each concept before moving on.

I've just finished a large personal milestone – I was able to successfully send a cURL HTTP request through a network interface into my stack of libraries, through my own BPSK implementation, framed in my own artisanal hand crafted Layer 2 framing scheme, demodulated by my code on the other end, and sent into a Linux network interface. The combination of the Layer 1 PHY and Layer 2 Data Link is something that I've been calling "PACKRAT".

In an effort to "pay it forward" to thank my friends for their time walking me through huge chunks of this, and those who publish their work, I'm now spending some time documenting how I was able to implement this protocol. I would never have gotten as far as I did without the incredible patience and kindness of friends spending time working with me, and educators publishing their hard work for the world to learn from. Please accept my deepest thanks and appreciation.

The PACKRAT posts are written from the perspective of a novice radio engineer, but experienced software engineer. I'll be leaving out a lot of the technical details on the software end and specific software implementation, focusing on the general gist of the implementation in the radio critical components exclusively. The idea here is this is intended to be a framework – a jumping off point – for those who are interested in doing this themselves. I hope that this series of blog posts will come to be useful to those who embark on this incredibly rewarding journey after me.

You can't get much higher praise than this from Bob McGwier N4HY (On Twitter - "Science Bob McGwier" / @BobMcGwier_N4HY):
Introduction to SDR (software defined radio) from someone who worked hard to learn.

I've only made time to casually browse this series but it really does look understandable for a typical techie. Something like this has been needed for a long time - how you go from software defined radio to data modulation / demodulation. With some focused study, I think even I could get this. Kudos K3XEC!

ZR > BEACON

[OSCAR-1](#) (Orbiting Satellite Carrying Amateur Radio)...

... was launched 60 years ago this past week (1961-12-12). There were a number of Amateur Radio media articles commemorating that milestone, but this was an interesting article about OSCAR-1 out of left field - [HOW AMATEUR RADIO FANATICS LAUNCHED THE WORLD'S FIRST PRIVATE COMMUNICATIONS SATELLITE](#). *Fanatics?* I guess I guess I can live with that descriptor. Also, I wasn't aware that OSCAR-1 was the first *private* satellite; I thought that was [TELSTAR-1](#) (1962-07-10).

Geoff's VT100 Terminal Kit

Just add a [TNC](#) for a real retro packet radio experience!



Photo courtesy of Tindie.com

[Kit](#) includes PCB and parts to build ASCII terminal that uses conventional PS/2 keyboard and VGA screen.

KB6NU's Adventures in Linux (for Amateur Radio)

I feel for Dan Romanchik KB6NU and his adventures in [trying various distributions of Linux](#) for Amateur Radio use. He had some success, and I'm eagerly awaiting future installments. My "successes" in Linux for Amateur Radio use have been only carefully cultivated Linux setups, and I largely operate them as an appliance operator. But I do want to eventually get better at Linux for Amateur Radio.

mTCP - TCP/IP Stack for DOS

[mTCP](#) is a set of TCP/IP applications for personal computers running PC-DOS, MS-DOS, DR-DOS, [FreeDOS](#), and other flavors of DOS. Of course, Amateur Radio Operators have been doing so with [KA9Q's NOS](#) since the mid 1980s, but [mTCP](#) is being maintained. He actually tests it to run on DR-DOS?

All of these applications will run well on the oldest, slowest PC that you can find - I routinely use them on an IBM PCjr made in 1983 because nothing beats the fun of putting a 35+ year old computer on the Internet.

9 Long Range Walkie-Talkies to Communicate Effectively

If you're thinking of a last minute gift, [this article](#) looks like a reasonable roundup of non-Amateur Radio portable radios for Family Radio Service (FRS) and General Mobile Radio Service (GMRS).

Contributors This Issue

- My ongoing Thanks to Tina Stroh KD7WSF for, well, *everything*, Bill Vodall W7NWP as *Zero Retries Instigator in Chief*, and Larry Gadallah NM7A for his long term encouragement about Zero Retries.
 - My ongoing Thanks to pseudostaffers [Dan Romanchik KB6NU](#), [Jeff Davis KE9V](#), and [Steve Lampereur KB9MWR](#) for continuing to spot, and write about "Zero Retries Interesting" type items, on their respective blogs, from Amateur Radio and beyond, that I don't spot on my own.
 - For those that get the reference, [Southgate Amateur Radio News](#) is, to me, the "[Slashdot](#)" of Amateur Radio, and I follow them both on Twitter and their RSS feed. They consistently surface "Zero Retries Interesting" stories, such as the ÖVSV WRAN hardware discussed this week.
 - Joseph Trimble WB7PKY alerted me to the article on non-Amateur Radio portable radios. Thanks Joseph!
 - Larry Gadallah NM7A was the first to alert me to the Icom SHF radio project. Thanks Larry!
-

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, here are some pointers:

- **Ham Radio for Dummies** by Ward Silver N0AX is now in its [4th edition](#). N0AX is a gifted writer, and HRFD is a great overview of Amateur Radio.
- My favorite YouTube channel for a good overview of Amateur Radio, the one I recommend is **AmateurLogic.TV**. [These folks](#) just seem to have so much fun!
- Dan Romanchik KB6NU offers a free **No-Nonsense Study Guide** for the [Technician test](#) (PDF).
- [HamExam.org Amateur Radio Practice Exams](#) offers good **Flash Card and Practice Exams**.
- When you're ready to take an **Amateur Radio examination** (Tech, General, or Extra), W1MX - The MIT Amateur Radio Society offers [remote exams](#), free for students and youngsters. *There are apparently many other remote exam options.*

And, *bonus* - with an Amateur Radio license, you'll be [more attractive on dates](#) 😊

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More bits from Steve Stroh N8GNJ:

- [SuperPacket blog](#) - *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*
- [N8GNJ blog](#) - *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs - Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ
Bellingham, Washington, USA
2021-12-17

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Below is a much more complete “footer” that has evolved over 30+ issues of ZR.

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Closing the Channel

- In its mission to grow Amateur Radio and make it more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to anyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex!
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Thanks for reading!

Steve Stroh N8GNJ (He / Him)

These bits were handcrafted in beautiful Bellingham, Washington, USA

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